SD 11
.A1 A42
no 393

LIBRARY FILE COPY
INTERMOUNTAIN STATION

United States
Department of
Agriculture

**Forest
Service**

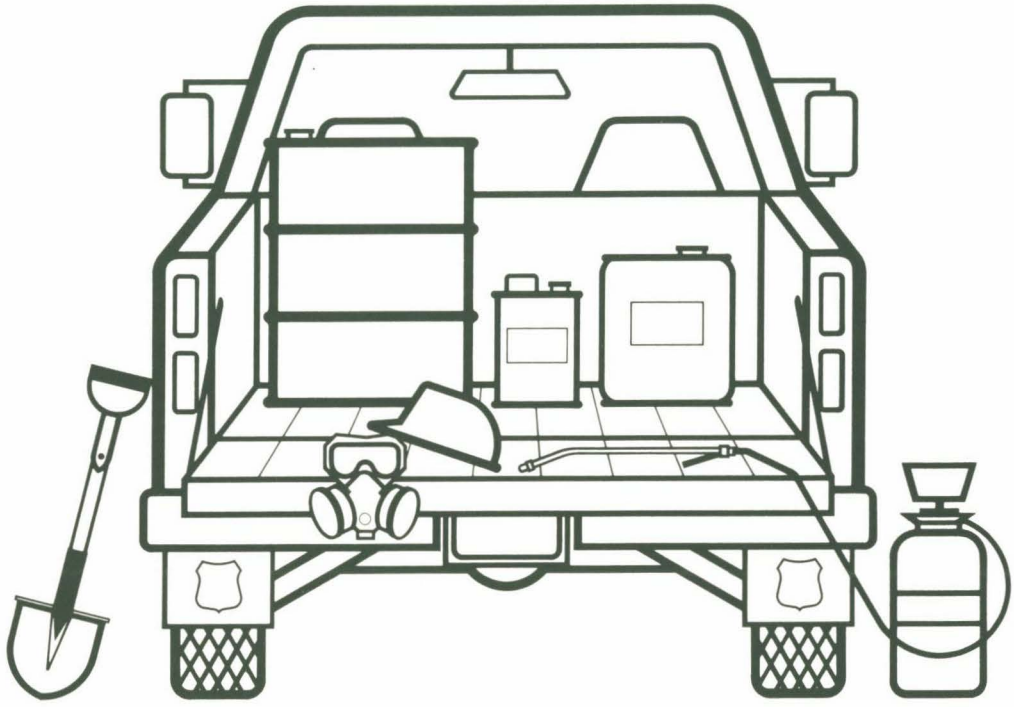
FS-393

Safety Training for Forestry Herbicide Applicators

FS INFO-Intermountain
MONTHLY ALERT
Edition OCT 1988
Item No. 230
File SD 11 .A1A42 no.393

Safety Training for Forestry Herbicide Applicators

Max Williamson and Charles I. Shade[1]



[1]Respectively Regional Pesticide Specialist and Public Affairs Officer with the USDA Forest Service Pest Management staffs, State and Private Forestry, at Region 8 and the Washington Office.

Preface

This booklet is written to help train you, a Forest Service employee, to work safely with herbicides (chemicals that kill or control plants).

The training it provides can be used by all people who work with herbicides in the field. It is not meant to teach the use of particular herbicides, when and how much to apply, or the handling of application contracts, although some of those things will be mentioned.

The main reason for this training is to give you a basic knowledge of the materials you will be using to control unwanted weeds, grasses, and trees. An understanding of safe methods of application, protective clothing and equipment, and proper cleanup procedures will ensure safety for you and others.

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others that may be suitable.

February 1986

Contents

	Page
Introduction	6
Words and Terms To Understand	6
Use of Herbicides	7
Organization of This Self-Study Guide	8
Toxicity	9
Words and Terms To Understand	9
Measurement of Toxicity	10
Self-Test No. 1—Toxicity	14
Pesticide Labeling and Registration	16
Words and Terms To Understand	16
Pesticide Registration	16
Information on a Pesticide Label	17
Self-Test No. 2—Pesticide Labeling and Registration	19
Examination No. 1	20
Mixing and Applying Herbicides Safely	21
Words and Terms To Understand	21
How Herbicides Work	22
Some Registered Uses of Herbicides Common to Forestry	22
Precautions To Take	24
Self-Test No. 3—Mixing and Applying Herbicides Safely	27
Transporting Herbicides	30
Self-Test No. 4—Transporting Herbicides	32
Storage and Spills	34
Storage Procedures	34
Managing Spills	35
Self-Test No. 5—Storage and Spills	36
Disposal of Containers	38
Rules To Follow	38
Self-Test No. 6—Disposal of Containers	39
Review of Application Practices	40
Answers and Discussion	43
Self-Test No. 1—Toxicity	43
Self-Test No. 2—Pesticide Labeling and Registration	44
Self-Test No. 3—Mixing and Applying Herbicides Safely	44
Self-Test No. 4—Transporting Herbicides	45
Self-Test No. 5—Storage and Spills	46
Self-Test No. 6—Disposal of Containers	46
Examination No. 2	46
Checklist for Review	47

Introduction

The greatest asset of the Forest Service is its employees. The Forest Service could not carry out its many responsibilities to all the people of this Nation without employees who know what they are doing, and who are hard working, dedicated, and concerned. The welfare of each of these workers is of paramount concern to the Forest Service.

The Forest Service uses a number of techniques in its management of forests: mechanical and manual means as well as fire and pesticides. Pesticides are used only after a thorough study shows that their effects, costs, and possible danger to the environment and people have been properly evaluated.

If we did not control the unwanted, harmful vegetation in our forests, we could no more grow trees for homes and industry than a farmer could grow our food in a field choked with weeds and grasses.

The good life that we have come to expect depends on many everyday chemicals around us. Today's food crops are often dependent on fertilizers and pesticides. Without these chemicals, getting enough food would take all the time most of us have. And we wouldn't live as long doing it. Since 1900, the average lifespan in the United States has increased from about 47 years to over 70 years. Much of this has come about through the knowledge and use of modern chemicals in medicine and in the production of more abundant, healthful foods.

The purpose of this self-study guide is to give workers who need to use herbicides enough know-how and skill to keep themselves safe and not harm the environment where herbicides are being used.

As you read this booklet, you will find a number of long words, many of them new to you. You will have to learn them in order to study and talk about the work you will be doing. If you are unsure of a word or do not know how to pronounce it, ask for help.

Words and Terms To Understand

Pesticides—Chemicals that control, prevent, destroy, or regulate pests. Pests are forms of life that are unwanted at a particular time and place. All pesticides are toxic (poisonous). Some pesticides are more toxic to humans than others.

Insecticides

Pesticides that kill or control insects.

Fungicides

Pesticides that kill or control fungi.

Rodenticides

Pesticides that kill or control rodents (rats, mice, and the like).

Herbicides

Pesticides that kill or control plants. These are generally the pesticides that are least toxic to humans. Herbicides used to control plants or algae in ponds, lakes, rivers, and other bodies of water are called **aquatic herbicides.**

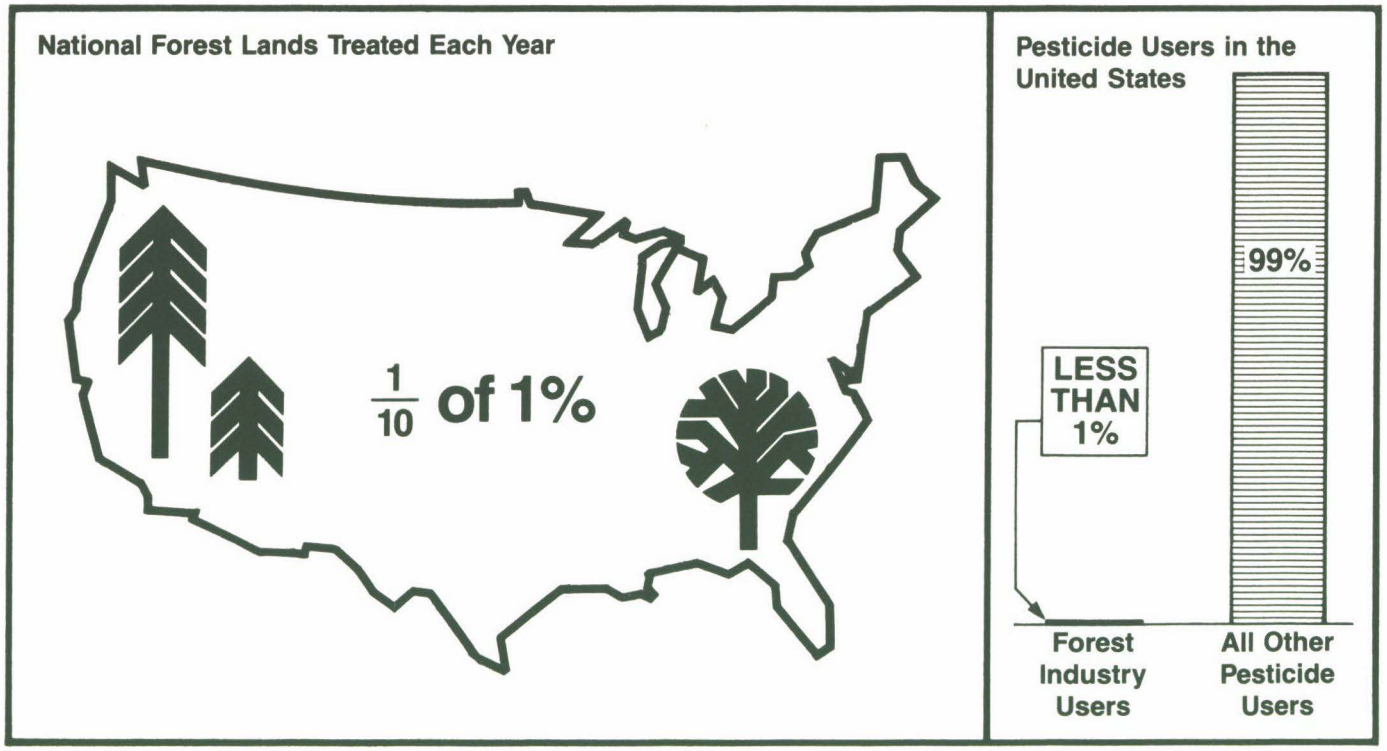
Insect repellants

Pesticides usually used on a person or animal to keep off insects, ticks, chiggers, and the like.

Use of Herbicides

The Forest Service uses herbicides to control weeds and other unwanted vegetation among trees. These same herbicides are widely used for other purposes. They are used by many industries, and they are used in large amounts by farmers to protect food crops. Many homeowners use them to kill weeds around their homes. The **largest** users of herbicides are industry, farmers, and homeowners.

Less than 1 percent of all the pesticides used in the United States is used by the forest industry. And that includes the Forest Service, State forests, and timber companies. Only about *one-tenth* of 1 percent of National Forest land is treated with herbicides each year. Even that area is not treated very often. Some acres will be treated once or twice every 60 or more years.



Organization of This Self-Study Guide

After the "Introduction," each section of this study guide except "Review of Application Practices" is followed by a self-test. Read each section carefully before you answer the self-test questions. These questions are written to help you remember important facts. They will not be graded.

Answers to the self-test questions are in the back of the booklet. Don't read the answers until after you take the self test. The answers and discussion should help clear up any points you are not sure of. If they do not, ask questions.

Your district pesticide coordinator is in charge of this training. If you have a question or do not understand any of the material, check with this person. Work at your own speed. You may go back and review any section. In fact, it is a good idea.

After you finish a number of sections, your district pesticide coordinator may wish to test you. We suggest that you take the first of these tests after the second self-study section. If you pass, you will go on to the next section. If you do not pass, you will have to study the material again. If you need help on any of the material before or during your review, ask questions.

Each examination may have multiple choice or true or false questions. A score of 70 or better is passing. There are no trick questions. But on some questions you must pay close attention to be sure you pick the best answer.

Your district pesticide coordinator may take questions from this guide, but he may also wish to test you on material that applies to your specific location, herbicides, and local laws and practices.

To use an herbicide safely, you must know how toxic that chemical is. This is called its toxicity. You must know how to handle herbicides and how to store, mix, and apply them safely; how to clean up small spills; how to dispose of containers; and how to prepare the required incident and accident reports. The section that follows defines toxicity and explains how it is measured.

Toxicity

Our world is made up of chemicals. The air we breathe, the water we drink, the food we eat, and the medicine we take are all chemicals. Hundreds of years ago a man called Paracelsus said, "The difference between a medicine and a poison is the dosage." This is still true today. That is why the label on a medicine telling you how much to take is so important. Taking too much aspirin can kill.

The caffeine in coffee and the nicotine in cigarettes are poisonous chemicals too. People who use them are not poisoned because they take them in small quantities that do not build up (accumulate) in the body.

Generally, such chemicals pass from the body, in one form or another, with waste products. Since this happens within hours or at most within a day or two, the chemicals do not build up to a level high enough to poison us. In the same way, the chemical herbicides used today by the Forest Service pass through the body if they do enter it.

Words and Terms To Understand

Toxic

Poisonous.

Toxicity

The measure of a chemical's ability to cause injury or death; how poisonous a chemical is.

Exposure

A way to say that a chemical has been swallowed or breathed, or has come in contact with skin. Does not mean any particular amount of chemical.

Hazard

The degree of exposure combined with the level of toxicity of the pesticide.

LD50

The amount of chemical that will kill half the test animals who take it. LD50 for "lethal dose, 50 percent," a common way to express the toxicity of a substance. An LD50 is usually stated in mg/kg (milligrams per kilogram).

mg/kg (milligrams per kilogram)

A way to express an amount of chemical per unit of animal weight.

Acute toxicity

The measure of a chemical's ability to cause injury or death after an animal or person is exposed to it once.

Chronic toxicity

The ability of a substance to cause injury or death after a long exposure.

Oral toxicity

The ability of a substance to cause injury or death if swallowed.

Dermal toxicity

The ability of a substance to cause injury or death if passed through unbroken skin.

Inhalation toxicity
The ability of a substance to cause injury or death if breathed.

ppm (parts per million)
A way to express the amount of pesticide in food, plants, animals. (One ppm is equal to about 1 ounce in 62,500 pounds, or 1 tablespoon in 3,906 gallons.)

ppb (parts per billion)
Another way to express the amount of pesticide in food, water, or other material. A smaller measure of pesticide than ppm. (One ppb is equal to about 1 ounce in 62,500,000 pounds, or 1 tablespoon in 3,906,000 gallons.)

Measurement of Toxicity

Toxicity is the capacity of a substance to produce injury. Given in a large enough dose, most chemicals are toxic in some degree to plants, animals, and human beings. Some pesticides are almost nontoxic; others are highly toxic. They vary in toxicity. Insecticides, for instance, are generally more toxic to animals and people than are herbicides.

To understand just how toxic some chemicals are, we need to understand how toxicity is measured. Test animals, such as mice, rats, and rabbits, are specially bred for the laboratory. They are generally used for the first testing of chemicals by being fed a measured dosage of the chemicals (oral exposure). Some are allowed to breathe a measured amount (inhalation exposure). And some have their skin and eyes exposed to the chemical (dermal exposure).

By testing a large number of animals, scientists quickly find a dosage of the chemical that makes some of the animals sick and causes others to die. Additional testing shows the amount of chemical needed to kill half (50 percent) of the animals tested. The amount needed to kill 50 percent of the test animals is called the "lethal dose, 50 percent" or LD50. When the chemical is in the air or is in water, the amount needed to kill 50 percent of test animals is called the "lethal concentration, 50 percent" or LC50. As a part of the dermal exposure tests, the scientists check the skin and eyes of test animals for irritation and damage. These tests are just the beginning in setting standard measures of toxicity. These can later be related to human beings.

LD50's are generally shown as a comparison between the weight of the chemical and the weight of the test animal. For example, milligrams (mg) of pesticide are compared to kilograms (kg) of body weight of the test animal. This is written mg/kg. There are 1 million milligrams (mg) in 1 kilogram (kg).

For any LD50, the smaller the number of milligrams per kilogram, the more toxic the chemical. The smaller the weight of the chemical per weight of the animal, the more toxic. In other words, less chemical is needed to have a 50-percent chance of killing the animal. A chemical with an LD50 of 2 mg/kg is a lot more toxic than a chemical with an LD50 of 200 mg/kg.

In fact, if the LD50 of a chemical is 1 mg/kg, and that of a second chemical is 10 mg/kg, the first is 10 times more toxic than the second. In another example, if the first chemical has an LD50 of 1 mg/kg, and a second has an LD50 of 1,000 mg/kg, then the first is 1,000 times more toxic than the second.

When a single dose of any size of a chemical is given, or when a single exposure of any amount to a chemcial happens, it is called an "acute" exposure. So, acute dermal exposure means a single dose on the skin, acute oral refers to a single dose taken by mouth, and acute inhalation means a single dose through the nose.

When there is one exposure after another to a pesticide or continuous exposure, it is called "chronic" exposure. Therefore toxicity can be described as **chronic dermal, chronic oral,** or **chronic inhalation** toxicity. Scientists use experimental animals to check for chronic toxicity. They check by feeding measured doses to some animals over a long period of time. They also investigate the chronic effects through several generations of animals to check effects on offspring.

There are three common ways for pesticides to enter the human body: through the skin, including the eyes; through the mouth; and through the lungs.

Accidental oral exposure happens most often when pesticides are stored in unlabeled bottles or food containers instead of in their original labeled containers. Too many documented cases tell of people, especially children, drinking pesticides from soft drink bottles—or bottles that look like drink bottles. Accidents also occur when someone drinks water stored in containers that once held pesticides or other toxic chemicals.

Based on the toxicity of a chemical and the weight of the person, an estimate for an LD50 can be made. See table 1 for this estimate made in terms of ounces of chemical and a 175-pound person. This table is based on the toxicity of 14 pesticides and 4 other chemicals.

REMEMBER! When a pesticide is mixed with water, the toxicity of the mixture decreases as the amount of water increases—the more water, the less toxicity.

If 1 gallon of a pesticide is mixed with 1 gallon of water, the toxicity of the mixture is 50 percent less than the original pesticide, since the mixture is half water and half pesticide. When 1 gallon of a pesticide is mixed with 20 gallons of water, the toxicity of the mixture is reduced about 95 percent.

Hazard is a word you may see in other books about pesticides. It has to do with the level of toxicity of a pesticide combined with the degree to which one is exposed to it. To illustrate this: you might handle a sealed container of a very toxic chemical and never become exposed to it. But if the container leaked while it was in your hands, you might become exposed. So, the combination of a highly toxic chemical (its level of toxicity) in a leaky container (resulting in exposure) would create a hazard. The hazard of a chemical, then, is a measure of the risk of being poisoned.

So keep this in mind: The greatest chance for dangerous exposure (hazard) to a toxic substance is when handling, moving, and mixing pesticides in or from their original containers. When the pesticide is already mixed and ready for use, there is less danger from exposure. With premixed herbicides such as Tordon 101R and Banvel CST, their toxicity is reduced as a result of premixing.

Table 1—*Estimated acute oral and dermal toxicity[1] for 18 chemicals on a 175-pound person*

Chemical	Oral LD50[2]	Toxicity Category	Dermal LD50[2]
Nicotine	0.02 oz	Extremely toxic	N/A
Methyl Parathion (80%)*	0.03 oz	Extremely toxic	1 oz
Caffeine	0.21 oz	Extremely toxic	N/A
Lindane (20%)*	2 oz	Moderately toxic	3 oz
Sevin (50%)	2 oz	Moderately toxic	11 oz
Aspirin	3½ oz	Moderately toxic	N/A
2,4-D	3-7 oz	Moderately toxic	4 oz
Malathion (91%)	4 oz	Moderately toxic	12 oz
Table salt	9 oz	Moderately toxic	N/A
Banvel	7 oz	Moderately toxic	6 oz
Banvel CST	14 oz	Slightly toxic	6 oz
Garlon	7 oz	Moderately toxic	11 oz
Tordon 101*	8 oz	Moderately toxic	7 oz
Tordon 101R	18 oz	Slightly toxic	11 oz
Oust	14 oz	Slightly toxic	6 oz
Pronone 10G	14 oz	Slightly toxic	N/A
Roundup	15 oz	Slightly toxic	14 oz
Velpar L	20 oz	Slightly toxic	15 oz

N/A indicates not applicable.

[1]The estimated toxicity for the pesticides is based on the formulated product (as in the container before any additional mixing).

[2]Most LD50's are expressed as a range, reflecting experimental conditions, type carrier, species of test animals, and preciseness of the tests. These estimates fall within the range, and are only projections based on animal tests.

*Restricted use pesticide.

Self-Test No. 1—Toxicity

1. The capacity of a substance to produce injury is called its:

_____**a.** Hazard.
_____**b.** Risk.
_____**c.** Toxicity.

---

2. We are continually exposed to poisonous substances such as caffeine in coffee and nicotine in cigarettes, but we are not poisoned because the quantities are very small and:

_____**a.** The substances are not toxic.
_____**b.** The body does not retain them.
_____**c.** They have no oral toxicity level.

---

3. The average human lifespan in the United States has been:

_____**a.** Decreasing.
_____**b.** Increasing.
_____**c.** Remaining the same.

---

4. The ability of a chemical to produce injury if passed through the skin is its:

_____**a.** Dermal toxicity.
_____**b.** Oral toxicity.
_____**c.** Inhalation toxicity.

---

5. A part per million (ppm) is equal to about:

_____**a.** 1 gallon in 3,906 gallons.
_____**b.** 20 gallons in 3,906 gallons.
_____**c.** 1 tablespoon in 3,906 gallons.

---

6. The amount of chemical required to kill one-half (50 percent) of a population of test animals is called the "lethal dose 50" or LD50.

_____**a.** True.
_____**b.** False.

---

7. A chemical with an LD50 of 2 mg/kg is _____ toxic than a chemical of 200 mg/kg.

_____**a.** Less.
_____**b.** More.

8. When a pesticide is mixed with water, the toxicity of the mixture _____ as the amount of water increases.

_____**a.** Decreases.
_____**b.** Remains the same.
_____**c.** Increases.

9. Referring to table 1, you would expect the oral toxicity of table salt to be about _____ toxic than Velpar L.

_____**a.** 2 times more.
_____**b.** 2 times less.
_____**c.** 4 times less.

10. Referring to table 1, the estimated oral LD50 for Tordon 101R, in the container before mixing, for a 175-pound person is about 18 ounces (about 1 pint).

_____**a.** True.
_____**b.** False.

11. The common way(s) pesticides can enter the human body is (are) by:

_____**a.** Mouth.
_____**b.** Skin, including the eyes.
_____**c.** Lungs.
_____**d.** All of the above.

12. According to table 1, Roundup is considered to be:

_____**a.** Extremely toxic.
_____**b.** Slightly toxic.
_____**c.** Moderately toxic.

Answers and discussion for this self-test start on page 43.

Pesticide Labeling and Registration

Half a century ago, when a new chemical came into use, the main question was how well it did the job it was meant for. Very little attention was given to its possible effects on human beings or the environment. Before 1930, the first person exposed to a toxic chemical might well be its first guinea pig; the exposure came first, then the damage was checked. Today there is an early defense against injury, and that is the large amount of testing a chemical must go through before it reaches the public.

Words and Terms To Understand

Label
Information printed on or attached to a pesticide container.

Labeling
Refers to all printed instructions that come with a pesticide, or that are available to the public.

Registration
Approval by the U.S. Environmental Protection Agency (EPA) or a State agency for the use of a pesticide as specified on the label.

Research and Development
Scientific studies that are done before registration and before pesticides can be sold to the public.

Pesticide Registration

Today, before a new pesticide can be used, or even its label changed, it must meet standards established by the U.S. Environmental Protection Agency (EPA).

For a pesticide to be registered, the manufacturer must give the EPA scientific evidence that, **when used as directed,** it will: (1) not injure human beings, crops, livestock, or wildlife; (2) not damage the environment; and (3) not leave behind unacceptable residues in food or feed. There are many other requirements for registration that are too detailed for this discussion.

The research and development that leads to registration and labeling of a pesticide usually takes 6 to 10 years. A cost of over $10 million is not unusual. Research is done to find out how much chemical it takes to control which pests; how toxic it is; and if it will injure human beings, crops, wildlife, or livestock. Studies are made to find out if the chemical will cause cancer; affect offspring; harm the environment; build up in the body; have short-term or long-term effects on human beings, animals, or the environment; or result in other dangers. Scientists feed amounts up to near the LD50 to animals over a long time to check chronic effects, and also feed it to several generations of animals to find the effects on offspring.

The pesticide may be registered for testing use when research is almost finished; this is called conditional registration. Small amounts of a new product are sometimes used for testing on National Forests during research. During this time, its effects are watched closely. How does it affect the environment and the people who apply it? Blood samples, urine tests, and physical examinations may be made on applicators. Even after the pesticide is registered, the EPA, universities, and Federal agencies, including the Forest Service, review its uses and effects.

As you can see, the information on the pesticide label is based on long and careful research. That label cost a lot of time and money. It has been called the most expensive and best researched document there is, and that is probably true.

Forest Service work units should have labels and safety data sheets for every one of the pesticides being used. The safety data sheets give safety information for each pesticide. They are usually posted at the pesticide storage building and near a phone at the work center.

It is Forest Service policy that only **registered** pesticides can be used on National Forest land, and that they must be used the way the requirements and instructions (labeling) say. This must be **your** policy when you apply or handle pesticides too.

Labels and other labeling information are **legal** documents that must be followed by everyone using pesticides. There are both civil and criminal penalties for using a pesticide in any other way except the way the labeling says.

Information on a Pesticide Label

Pesticide labels must follow guidelines laid down by the EPA, and must contain **at least** the following information (in most cases, even more):

Active ingredient

The chemical or chemicals in a pesticide that do the job—that produce the desired effect.

Brand name

The maker's name for the product. For example, Roundup is a brand name. It contains the active ingredient glyphosate.

Signal words and symbols

Hazards to humans are shown on the label by signal words (words that signal or warn you) about the toxicity category (group). Each pesticide formulation (what goes into it) is put into a toxicity category that tells how hazardous it is to human health. The categories indicate the toxicity whether the pesticide is swallowed, inhaled, spilled on the skin, or splashed into the eyes.

The signal words **DANGER-POISON** and the skull and crossbones (symbols) must be on labels of all highly toxic substances (Toxicity Category I). The signal word **DANGER** can appear on the label of a pesticide that is only slightly toxic when the danger comes from something other than toxicity. In these instances, the reason for the signal word appears after the signal word. An example is Velpar L. Its label states **DANGER! CAUSES EYE DAMAGE. FLAMMABLE.**

The signal word **WARNING** must be on the labels of all **moderately toxic** pesticides (Toxicity Category II).

The signal word **CAUTION** must be on the labels of all **slightly toxic** pesticides (Toxicity Categories III and IV).

All labels must say "Keep Out of the Reach of Children."

The label must show a precautionary statement (a warning) that tells you how the product may be hazardous. For example, the statement may say the product is hazardous if splashed in the eyes; in this case it will tell you to wear goggles. The label may say the chemical is flammable and to keep it away from fire. There are many other precautionary statements. Look for them before handling the pesticide.

The label will also contain directions for use and how to avoid misuse, and list environmental dangers and other things you need to know to use the pesticide correctly and safely.

THE LABEL IS A TOOL—
LEARN HOW TO READ AND USE IT!

Self-Test No. 2—Pesticide Labeling and Registration

1. Today before a new pesticide is introduced for use by the public, it must be registered by:

   _____**a.** DOL.
   _____**b.** USDI.
   _____**c.** EPA.

2. Research and development that lead to registration and labeling of a pesticide may take 6–10 years and may cost more than:

   _____**a.** $10,000,000.
   _____**b.** $1,000.
   _____**c.** $10,000.

3. Before EPA will approve a pesticide for use, research must have been done in many areas, including research to determine if the pesticide causes cancer, affects offspring, or accumulates in the body.

   _____**a.** True.
   _____**b.** False.

4. A pesticide label is **not** a legal document.

   _____**a.** True.
   _____**b.** False.

5. A pesticide label indicates human hazards through the use of toxicity category signal words. The highly toxic materials are assigned to Toxicity Category I. The signal word (words) for this category is (are):

   _____**a.** CAUTION.
   _____**b.** WARNING.
   _____**c.** DANGER-POISON (with symbol skull and crossbones).

6. The label contains a precautionary statement that tells you ways in which the product may be hazardous. Therefore, you should read the label before using a pesticide.

_____**a.** True.
_____**b.** False.

7. It is Forest Service policy that only registered pesticides may be used on National Forest System lands.

_____**a.** True.
_____**b.** False.

8. Before a pesticide is registered for public use it must be tested on animals for chronic effects (long term).

_____**a.** False.
_____**b.** True.

Answers and discussion for this self-test start on page 44.

Examination No. 1

At this point in your self-study your district pesticide coordinator may wish to give an examination. Check with your coordinator. The examination is a pass or not-pass examination. A score of 70 percent is passing. If you do not pass, then study the areas again, and when you feel you know the material, request another examination.

Mixing and Applying Herbicides Safely

Mixing and applying herbicides are two activities during which there is a good chance of being directly exposed to the chemicals. Herbicides are among the least toxic of pesticides, but they must be used carefully. The following pages will tell you more about herbicides and ways to prevent harm to yourself, other people, and the environment.

Herbicides generally control plants by interfering with the needs of a plant, slowing its growth or killing it. So most herbicide effects take a fairly long time to show up on the treated plant. Some may not show effects for a month or longer. To judge the full effects of an herbicide you may have to wait 1 year or more after treatment.

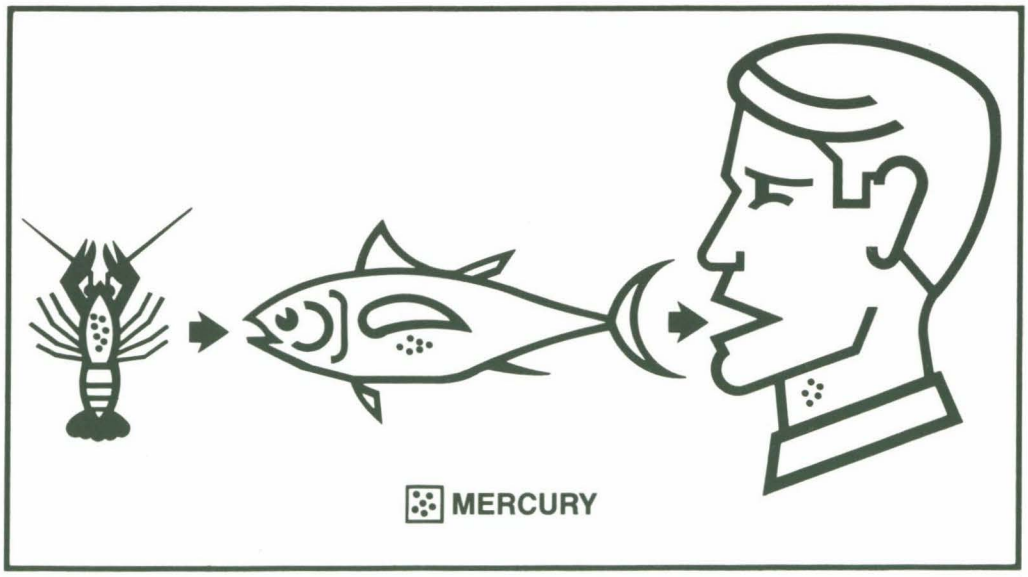
Words and Terms to Understand

Accumulate

To build up, to store.

Bioaccumulate

To build up or store in an animal or plant, starting with lower forms of life and moving into higher ones. Example: A fish eats a crawfish that contains the chemical mercury. Some of the mercury accumulates in the fish's body after the fish digests the crawfish. A person eats the fish and some of the mercury that was in the fish accumulates in the person's body. The person eats more mercury-filled fish, and the more he eats, the more mercury accumulates in his body.



How Herbicides Work

The herbicides used by the Forest Service are not very toxic, and they are not known to accumulate or bioaccumulate. In other words, these herbicides pass through animals and are lost with waste products.

There are two broad categories of herbicides—selective and nonselective. Selective herbicides are used to kill certain plants such as trees and weeds; they have little or no effect on others. Nonselective herbicides will kill many different kinds of vegetation.

Herbicides get into plants through their leaves, their stems, or their roots. Foliage spray herbicides enter the plant mainly through the leaves. Soil-active herbicides enter through the roots. Injection herbicides enter through cuts made in the plant's bark or stem.

Most herbicides can enter a plant's roots even when it is not labeled as a soil-active herbicide. So you should never spill any herbicides or wash equipment near plants (for example, trees) you do not want to kill.

REMEMBER! An herbicide is no better than the way it is applied. Poor application means loss of time, productivity—and money. And you may damage or kill plants outside the treatment area, called off-site areas.

Some Registered Uses of Herbicides Common to Forestry

Aatrex

The active ingredient is atrazine. A selective herbicide for grass and noxious weed control, wildlife habitat management, conifer release, and site preparation. Also used in corn and sorghum.

Amitrol-T

The active ingredient is amitrole. It is used as a nonselective herbicide for conifer release, general weed control, range improvement, and rights-of-way maintenance. It is also used in orchards, vineyards, and along ditches and roadsides.

Banvel

Contains the active ingredient dicamba, or dicamba and 2,4-D. It is used to control broadleaf weeds in field and silage corn, grains, asparagus, turf, pasture, rangeland, forests, fence rows, and roadways.

Dowpon

Contains the active ingredient dalapon. It is used for grass control and rights-of-way maintenance.

Garlon

The active ingredient is triclopyr. It is used for controlling woody plants and broadleaf weeds on rights-of-way, forests, and industrial sites.

Krenite

Contains the active ingredient fosamine ammonium. It is a selective herbicide used for conifer release, rights-of-way maintenance, noxious weed control, and range management.

Princep

Is a selective herbicide containing simazine. It controls annual and perennial grasses, broadleaf weeds, algae, and aquatic plants.

Roundup

The active ingredient is glyphosate. It is used to control many grasses and broadleaf weeds plus trees and woody brush species on cropland and noncropland sites. A few of the applications include: pre-emergence treatment of alfalfa, edible beans, and English peas; and control of weeds and grasses around apple trees, citrus, grapes, cherries, pears, and nut crops. Roundup is used also on rights-of-way, in canals, along fence rows, and in forestry.

Tordon

The active ingredients are picloram and 2,4-D or picloram by itself. It is used to control brush, to clear along utility rights-of-way, to control weeds and brush in pastures and rangelands, and to control broadleaf weeds in grain fields and forests.

Velpar

Velpar contains the active ingredient hexazinone. It is used on railroads, highways, utility and pipeline rights-of-way, and storage areas. Velpar is also used for selective weed control on industrial plant sites and drainage ditch banks, and in sugarcane, pineapples, rubber trees, alfalfa, pecans, and forests.

Weedone DP

The active ingredient is 2,4-DP. A postemergence herbicide frequently mixed with 2,4-D for conifer release, rights-of-way maintenance, general weed control, and recreation management. Also used as an aquatic herbicide.

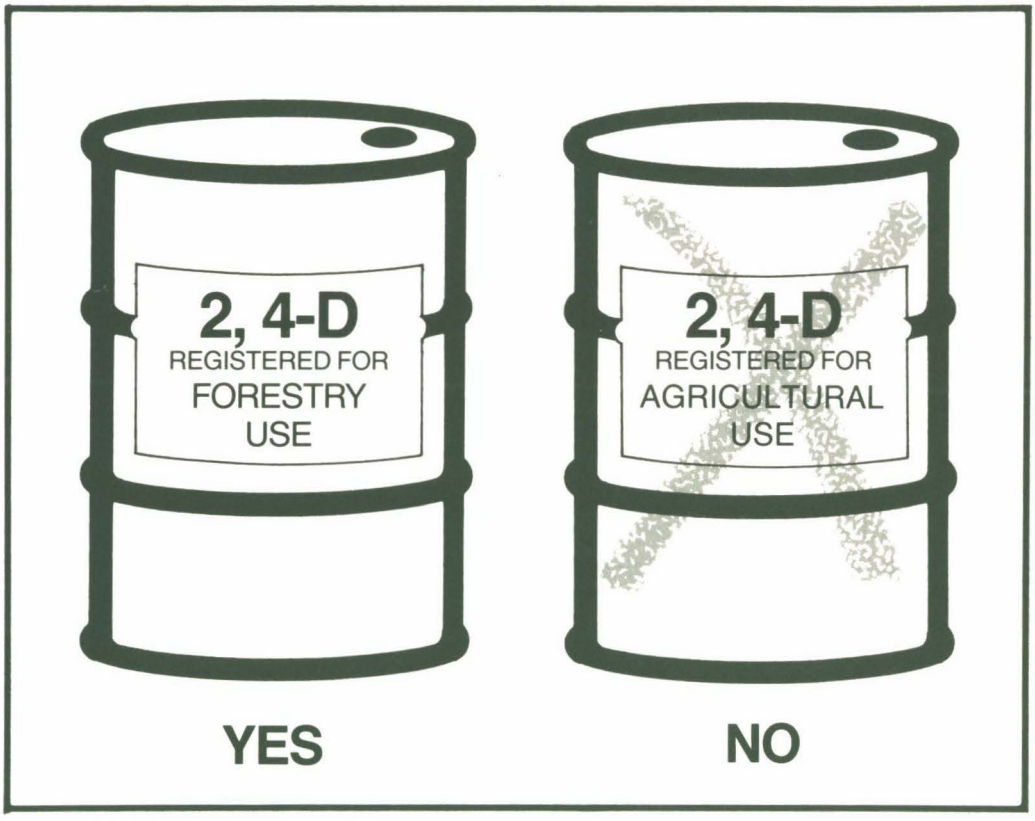
2,4-D

The active ingredient is 2,4-D. It is used on grasses, wheat, barley, oats, sorghum, corn, sugarcane, rice (Philippines), and on noncrop areas for the control of weeds such as Canadian thistle, dandelion, annual mustards, ragweed, and lambsquarters. Certain formulations are registered for pine release; aquatic weed contol; prevention of weed seed formation; and control of weeds in lawns, pastures, and golf courses.

This list does not include all the uses, but it will give you some idea of the large number of registered uses for each herbicide. And forestry is only one of the minor uses.

A Precaution To Take

Something to be careful about—one trade name may sound like another trade name. Sometimes two herbicides will have the same formulation, and even the same name, but one will be listed for forestry, and one will list another use. You must **not** use an herbicide for a purpose that is not on the label—even if you think it will work. For example there is 2,4-D registered for forestry, and there is 2,4-D registered for agricultural use only. It is illegal to use 2,4-D registered for agricultural use only in forestry work.



Always read the label before you mix or apply any herbicide.

Look for precautionary statements and warnings. Heed them.

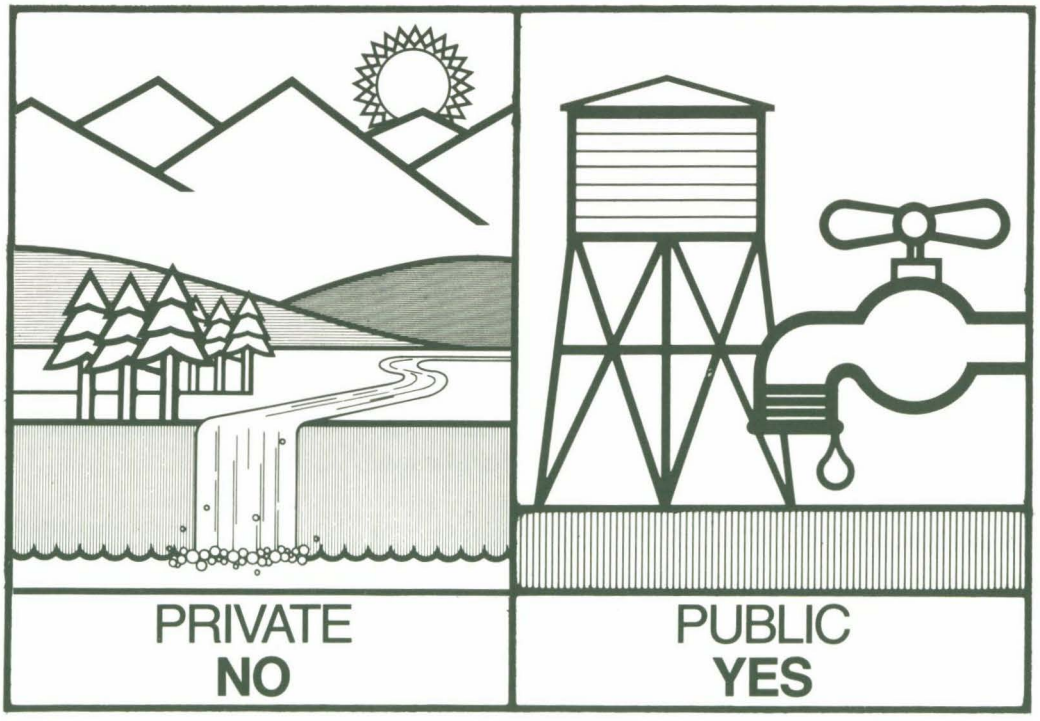
Use the protective clothing and equipment listed on the label. Forest Service policy requires that only registered herbicides be used on National Forest System land. Herbicide use must follow label instructions.

At the very least, the person applying herbicides should always wear clothing that is made of tightly woven cloth—a long-sleeved shirt, long pants, and a hard hat with plastic liner. Waterproof boots should be worn, as specified by the label. If leather boots are worn, they should be waterproofed with a good sealant. Specific label requirements for protective clothing and equipment shall be followed.

Never put contaminated equipment into your mouth. Keep nozzles, hoses, and anything touched by a herbicide away from your mouth. **Do not** prime siphons with your mouth.

Water for mixing herbicides should come from public water supplies and carried into the field. Never take water from private springs, streams, ponds, or wells. The danger of getting a chemical into someone's water supply (contamination) must be avoided.

Before, during, and after herbicides are applied, clean wash water should be available for the crew. Soap, towels, eyewash, gloves, and goggles or face shields must be ready, as required by the label. There should be a change of clothing available (throw-away coveralls like Tivex are good) for a quick change in case of contamination.



If a herbicide gets into your eyes (splashed, from spray, or from contaminated hands) wash it out with clean water at once for the length of time the label says. This is generally 10 to 15 minutes. Then have your eyes checked by a doctor.

As we said earlier, herbicides in the container are more toxic and hazardous than after they are mixed with water. If you mix one part herbicide with the same amount of water (1 to 1)—or one part herbicide to five parts water (1 to 5)—or 1 to 20 and so on—the toxicity of the mixture is that much less each tme. A 1-to-1 mixture is half as toxic as the unmixed herbicide; a 1-to-5 mixture if five times less toxic. When you pour a pesticide from the original container, be sure that if the wind is blowing, it comes from your back or side—not into your face. And keep the opening in the container *below* your eye level. Be sure you are wearing protective clothing, if called for, and using the right equipment.

If you have cuts or skinned places, check with your supervisor before applying herbicides. Small cuts and scrapes may be protected by gloves or a waterproof bandage—but do check.

Wash your hands, forearms, and face before you eat, drink, smoke, or rub your tired eyes.

Change your clothing every day. As soon as you get home, take a shower and change clothes. Wash your work clothes every day—separately, not in with your regular wash.

Every day—before beginning application—check the equipment for leaks and to see that it is working properly; check the calibration; and test the sharpness of injector blades. See that nozzles are clean and pointed in the correct direction, and check everything else to be sure you will be working in the safest way. At the end of the workday, clean and check all equipment again.

When working with or near herbicides being sprayed, try to stay upwind from the nozzle, so that the herbicide will be blown away from you.

If medical treatment is needed during herbicide application, take a copy of the label and safety data sheet for the doctor to read. The doctor needs to know that information.

When anyone asks you about herbicides and their uses, send that person to your supervisor for answers. If you are absolutely sure you can answer the question and you do, tell your supervisor what was asked and how you answered.

Self-Test No. 3—Mixing and Applying Herbicides Safely

1. Herbicides are used to control:

_____**a.** Insects.
_____**b.** Plants.
_____**c.** Rodents.

2 . Herbicides used in forestry:

_____**a.** Are mainly for forestry use only.
_____**b.** Are sometimes used in agriculture and industry.
_____**c.** Are used mainly in agriculture and industry.

3. Herbicides used by the Forest Service have a _____ order of toxicity.

_____**a.** High.
_____**b.** Low.

4. If you want to kill only certain plants while having little or no effect on other plants, use a:

_____**a.** Nonselective herbicide.
_____**b.** Either a nonselective or selective herbicide.
_____**c.** Selective herbicide.

5. It's safe to wash herbicide application equipment near a tree or other plants you don't want to kill, if the herbicide is **not** labeled as a soil-active herbicide.

_____**a.** True.
_____**b.** False.

6. The herbicides used by the Forest Service are not known to accumulate in the human body.

_____**a.** True.
_____**b.** False.

7. The herbicide label should _____ be read, and precautionary statements and other instructions for use followed.

_____**a.** Sometimes.
_____**b.** Never.
_____**c.** Always.

---

8. It is a preferred practice to take water for mixing herbicides from:

_____**a.** Private streams or ponds.
_____**b.** Private wells or springs.
_____**c.** Both a and b.
_____**d.** Public water supplies.

---

9. If you have cuts and skin abrasions, there is no need to check with your supervisor before applying herbicides.

_____**a.** True.
_____**b.** False.

---

10. The amount of pesticides used in forestry management by the Government, industry, private landowners, etc., represents _____ of the total pesticides used in the United States.

_____**a.** Less than 1 percent.
_____**b.** 10 percent.
_____**c.** 15 percent.

---

11. If a herbicide is splashed into someone's eyes, it should be:

_____**a.** Washed out with water at the end of the day.
_____**b.** Immediately washed out with water.
_____**c.** Of no concern.

---

12. If 1 gallon of a herbicide is mixed with 20 gallons of water, the toxicity of the resulting mixture is reduced about:

_____**a.** 20 times.
_____**b.** 2 times.
_____**c.** 10 times.

13. About _____ of the National Forest System land is treated with herbicides each year.

_____**a.** 2 percent.
_____**b.** One-tenth of 1 percent.
_____**c.** 10 percent.

Answers and discussion for this self-test start on page 44.

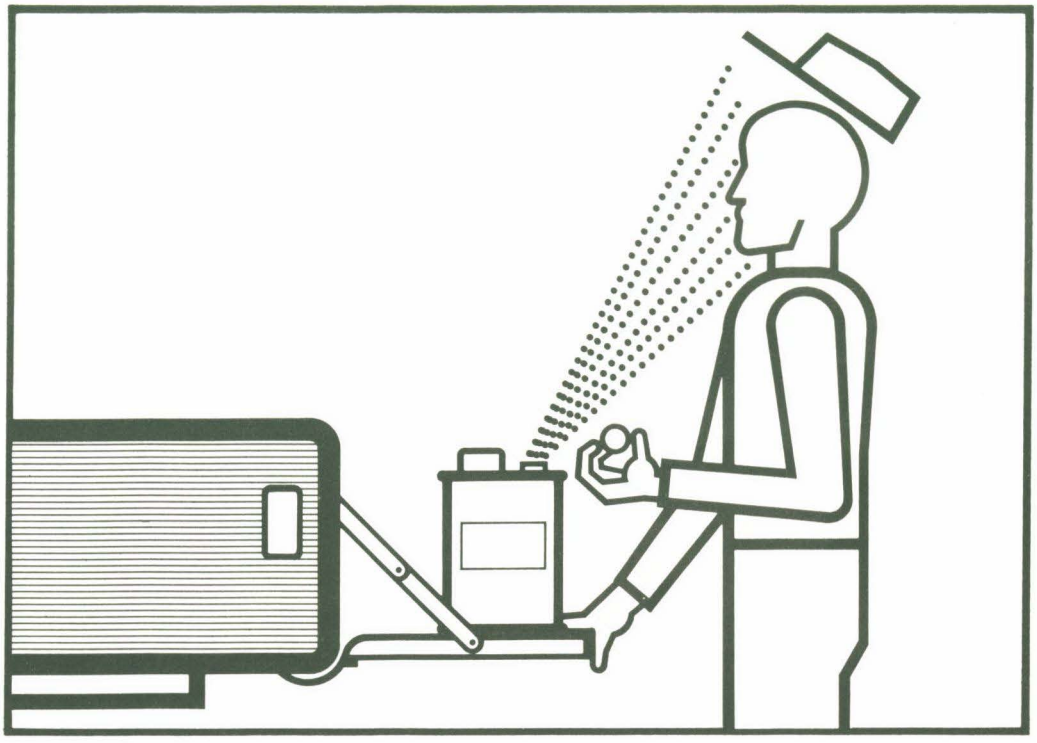
Transporting Herbicides

Safety is of top importance when herbicides are moved from place to place. There is always a chance of damage to containers when loading and transporting; accidental spills can occur. Highway accidents are possible and they can result in spillage.

Precautions to Take

The following precautions can be helpful in safetly transporting herbicides:

- When transporting 50 gallons or more of herbicides, have a project safety plan to go along with the shipment. In case of an accident, follow the plan.
- See that containers are undamaged before and during loading.
- Take only the amount of herbicides you will need for 1 day's work. Leave the rest in the storage building. If any herbicide is left over at the end of the day, return it to the storage building.
- Do not transport herbicides in the passenger section of a vehicle. Put them in pickup truck beds or on trailers away from the driver and passengers. Keep herbicides away from drinking water, food, seeds, or anything that can become contaminated.
- Tie down containers so they will not move around during transportation.
- From time to time during the trip, check to be sure containers are not shifting and that no spillage has occurred. Stop the truck and go back to look if you are not sure.
- Keep a shovel on the truck to use for spills.
- Do not leave a vehicle by itself if it contains herbicides, unless the herbicide can be made safe against theft, damage, and handling. Be especially careful in an area where children are—or where they might come around.
- Do not cross private fields or travel across farm lots or private property when transporting herbicides unless there is no other way. If you must cross private land, get permission from the landowner first.



- Park the vehicle in the shade at the work site or anywhere else it may sit for a while. Heat can cause pressure to build up inside the containers. They may overflow violently when opened.

- In case of an accident, take care of any injured person first. Do not move an injured person unlesss you are absolutely sure you won't injure the person more. Remove contaminated clothing and wash off herbicide. If clothing cannot be removed, pour water over the contaminated portion of the person and the clothing. Be sure the wash water (which becomes contaminated) does not further contaminate the person. **Always check for eye damage and contamination.** If the eyes have been contaminated, flush with clean water for at least 15 minutes.

- Always try to keep a spill from spreading (after you have helped anyone injured). Keep the spill away from streams and other bodies of water. Most of the time, this can be done by shoveling up a dike or dam of earth around the liquid and spreading soil over it.

- Always notify the district ranger's office when an accident occurs.

- **Keep people away from accidents where herbicides are spilled.**

Self-Test No. 4—Transporting Herbicides

1. On Mondays, you should load the transport vehicle with a week's supply of herbicides. Then leave all leftover herbicides on the vehicle at the end of the day.

   _____**a.** True.
   _____**b.** False.

2. Herbicides should be transported inside:

   _____**a.** Passenger vehicles.
   _____**b.** Truck beds or trailers.
   _____**c.** Either a or b.

3. It's all right to leave herbicides unsecured in a vehicle, because no one will be interested in taking them.

   _____**a.** True.
   _____**b.** False.

4. To save time in traveling to work sites, it's an acceptable policy to cross farm lots or other private land when transporting herbicides.

   _____**a.** True.
   _____**b.** False.

5. Excessive heat from the sun can cause pressure to build up in a herbicide container; that could cause violent overflow when the container is opened. So you should park the vehicle in the shade.

   _____**a.** True.
   _____**b.** False.

6. If an accident occurs and a herbicide is spilled on someone, the contaminated clothing should be removed and the herbicide washed off the person with soap and water. Also, if the eyes have herbicide in them, flush with water for at least:

_____**a.** 2 minutes.
_____**b.** 5 minutes.
_____**c.** 15 minutes.

7. It is a good policy to always have soap, water, towels, eyewash container, and a shovel on a vehicle transporting herbicides.

_____**a.** True.
_____**b.** False.

Answers and discussion for this self-test start on page 45.

Storage and Spills

Pesticides should be stored in a building set aside for that purpose. There should be a sign on it that says it is a pesticide storage building. To make it easier to manage spills: (1) there should be a water supply that is easy and quick to reach, and plenty of material like kitty litter that will soak up liquids; (2) the floor should be concrete, sloping to a drain with a sump big enough to hold the contents of the largest container stored in the building. There should be an easy way for air to get in and out (good ventilitation). The storage building should not be near other buildings.

Storage Procedures

Do not eat, drink, or smoke in the storage building.

Always lock the door of the herbicide storage building.

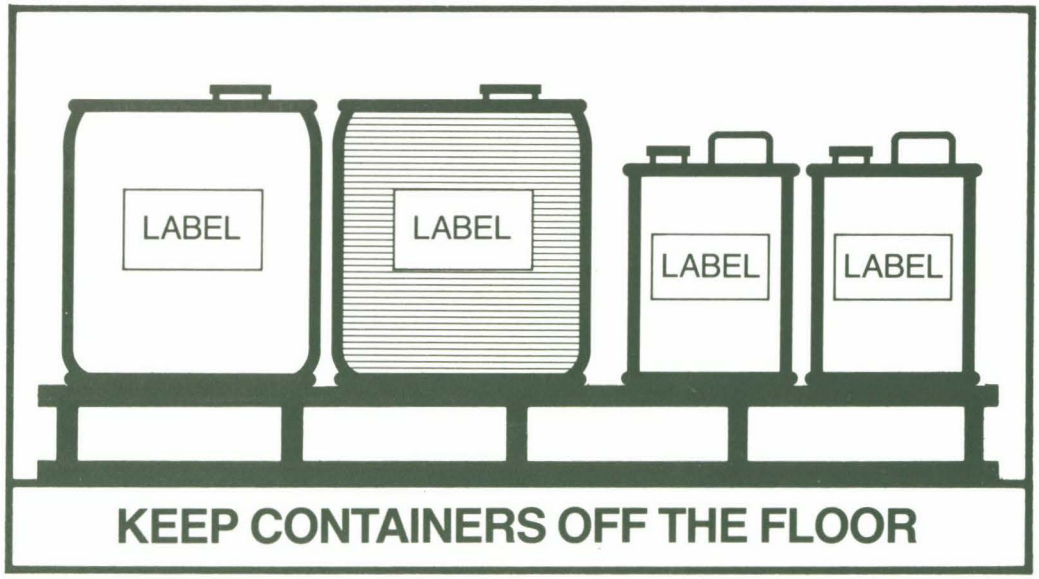
Never store food, feed, seeds, drinking water, clothing, paint, gasoline, fertilizer, or anything but pesticides and their application equipment in the storage building.

Always store herbicides in correctly labeled containers with the labels facing out so you can read them. Never store herbicides in food or drink containers.

Store herbicides in metal containers up off the floor to keep them from rusting.

Check containers frequently to be sure lids are tight and that containers are not damaged or leaking. Report to your supervisor any damaged or leaking containers.

Report to your supervisor if *any* liquid is in the sump.



Keep an up-to-date list of everything stored in the building. This inventory should be posted on the building and near the phone at the work center. Emergency phone numbers should be posted along with instructions to follow in case of fire.

If the storage building catches fire, call the fire department at once. Also call the person in charge of the building and the district office. Do **not** aim heavy streams of water on the building; this could wash herbicides into streams or onto farm fields, homes, and other land. **Do** spray mists of water or dry fire-fighting material to keep the fire from spreading. Do not breathe the smoke or fumes. Shovel up dirt to make a dam or dike on the lower side of the building to stop runoff. A fire tractor will do this job rapidly.

Managing Spills

Spills can happen any time you handle, store, move, or use herbicides. When a spill occurs, notice two things: how big the spill is, and where it will flow. Your actions will depend on its size, and what may be contaminated unless its flow is stopped.

Small spills may need only a spot cleanup. A large spill near a road bank or ditch calls for greater cleanup. Use your shovel; work fast to keep the chemical from draining into streams or any body of water. Spread soil over the liquid. When a large spill happens, notify your supervisor or district office **at once.** Keep people away. For more details see FSH 2109.12. Learn what to do.

Take care of any injured or contaminated person. Remove contaminated clothing at once. Wash herbicide from skin, and use eyewash to cleanse eyes. Have someone call your supervisor or district office.

Do not leave the area unless someone is left to warn people of the danger. Someone may slip and fall into the herbicide, not knowing what it is.

Shovel up a dike around the spill. Use kitty litter (have it with you), slaked lime, sawdust, soil, or other absorbent material (material that will soak up liquid).

Get up as much of the liquid as you can with absorbent material. Then clean up the rest with soap and water. If the spill gets on soil and contaminates it, shovel up the top few inches and put it in a watertight bag or container (have some with you). Have your supervisor check the area and tell you what to do with the bag of soil and other contaminated material.

Notify Your Supervisor
or District Office
AT ONCE
When a Spill Occurs

Self-Test No. 5—
Storage and Spills

1. After the day's supply of herbicides is loaded, the building should be:

_____**a.** Left unlocked in case someone else needs to use the building.
_____**b.** Locked.

2. It is an acceptable practice to store the drinking water container in the pesticide storage building.

_____**a.** True.
_____**b.** False.

3. It is acceptable to smoke in the pesticide storage building because herbicides are not flammable.

_____**a.** True.
_____**b.** False.

---

4. If the sump inside the storage building contains a liquid, you should:

_____**a.** Report this to your supervisor.
_____**b.** Not be concerned.

---

5. If herbicide is spilled inside the pesticide storage building:

_____**a.** Don't be concerned because it's inside the storage building.
_____**b.** Don't be concerned about cleaning it up if it drains into the sump.
_____**c.** Immediately clean it up.

---

6. After you clean a small herbicide spill from the work center concrete parking lot, place the contaminated kitty litter, mophead, and other cleanup materials:

_____**a.** In the work center trash container.
_____**b.** In watertight containers for proper disposal.
_____**c.** Almost anywhere because a spill outside a building is not important.

---

7. An up-to-date inventory of pesticides in the storage building should be posted on the building and near a phone at the work center.

_____**a.** True.
_____**b.** False.

Answers and discussion for this self-test start on page 46.

Disposal of Containers

Rules to Follow

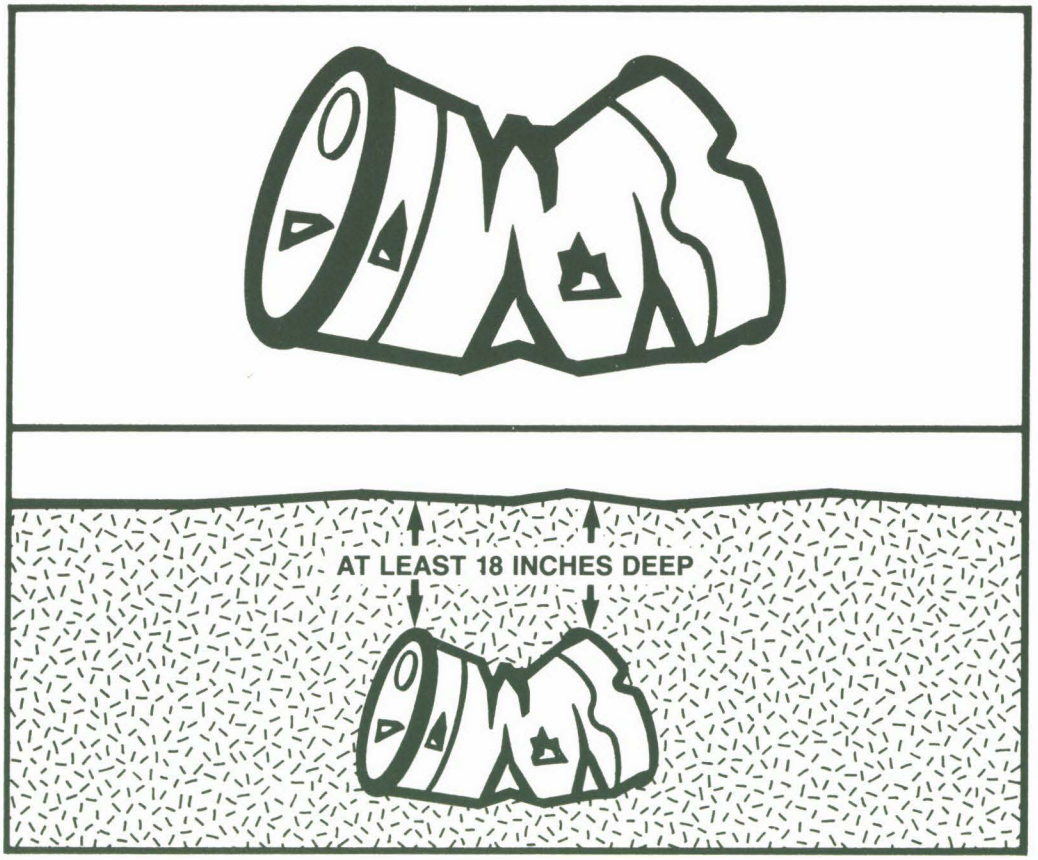
This section will cover safety precautions to observe when disposing of forestry herbicide containers.

Rinse empty containers **three times.** "Empty" herbicide containers are like "unloaded" guns: they always have something in them. Herbicide containers always contain small amounts of chemicals. Fill the container at least one-fifth full with water and slosh it around, making sure that water touches all parts of the inside of the container.

If herbicides are mixed with water for a spray job, pour the rinse water into the spray tank and apply it on the area being treated. If the herbicide is mixed with diesel or other oil, check with your supervisor on how to rinse.

When you are injecting trees or spraying stumps using a ready-mixed herbicide such as Tordon 101R or Banvel CST, spread the rinse water thinly over the area you are injecting or treating. Keep it away from crop trees or plants.

Never reuse herbicide containers to hold anything else. Sometimes metal containers (55-gallon drums) may be returned to a supplier.



Store empty containers and waste materials until you or your supervisor can dispose of them. Never leave them exposed on the work site.

Before disposing of metal or plastic containers, punch holes in them and flatten them. Break glass containers. Be sure they cannot be reused.

Rinsed and destroyed containers may be disposed of in an approved sanitary landfill.

You may bury rinsed and destroyed containers. Bury them at least 18 inches deep. Find an area where the soil is medium textured and high in organic matter. Stay away from streams and other water. It is best to bury containers on the site where herbicides have been applied or will be applied.

If State and local regulations permit, small quantities of some containers may be burned.

Self-Test No. 6—Disposal of Containers

---

1. All empty herbicide containers shall be:

_____**a.** Rinsed one time.
_____**b.** Rinsed two times.
_____**c.** Rinsed three times.

---

2. It is acceptable to reuse herbicide containers as gasoline cans if they are metal and in good condition.

_____**a.** True.
_____**b.** False.

---

3. A properly rinsed and destroyed herbicide container may be disposed of at an approved sanitary landfill.

_____**a.** True.
_____**b.** False.

---

4. An empty herbicide container may be buried on the herbicide application site without rinsing.

_____**a.** True.
_____**b.** False.

Answers and discussion for this self-test start on page 46.

Review of Application Practices

The following is a list of some work practices that can help you apply herbicides safely. You can surely think of many others.

Do not cross private property when carrying herbicides. If you must, get permission.

Do not mix herbicides or load equipment on private lands.

Do not get mixing or rinsing water from private wells, springs, streams, or ponds. This practice may ruin good feelings toward the Forest Service.

Do not clean application equipment or vehicles, and do not rinse containers on private lands or near streams, ponds, or any other natural water sources.

Do not leave empty containers on private lands or on the application site. Always dispose of them in the proper manner. Do not give them to people in the community.

Do not leave a vehicle loaded with herbicides on private land.

Do not park your vehicle in an area where the herbicides may be stolen or where children are likely to be present.

Leave a small buffer strip between Forest Service and private lands rather than risk the possible contamination of a private landowner's property.

Report immediately all accidents or incidents involving pesticides to your supervisor. It is much better to report these situations and possibly get reprimanded than to suffer later consequences.

Do not use the work center wash area for washing herbicide application equipment or for rinsing pesticide containers. Do this at the application site.

Plan to apply herbicide to an area when the area will **not** be heavily used. Use care applying herbicides to an unimproved camping area used by deer hunters. Especially do not apply herbicides just before the deer hunting season.

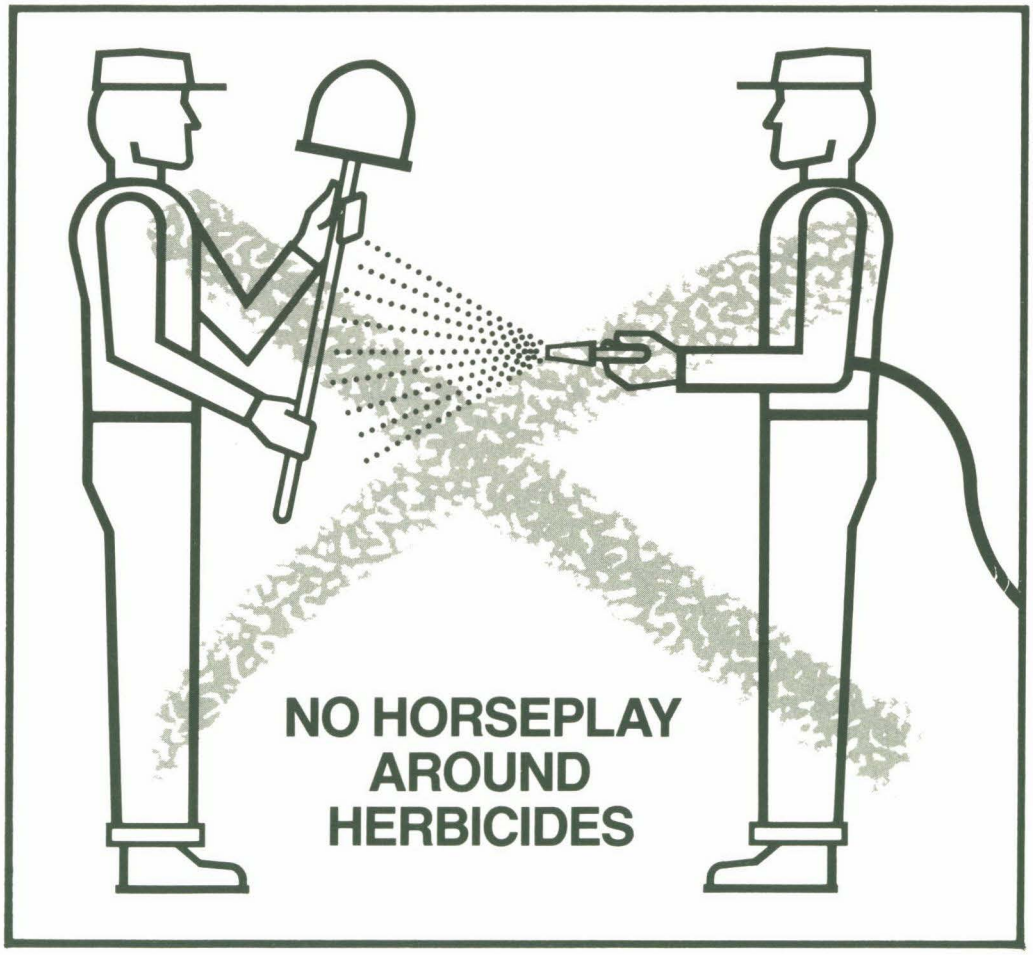
Wash work clothes every day—separately from the family wash. Always wash herbicides immediately from any cuts or skinned places on your body.

If medical treatment is required during the period you are applying herbicides, take a copy of the label and safety data sheet with you to the doctor.

To help encourage safety, report to your supervisor any unsafe practices on the job and also any unsafe practices by contractors, permittees, or others.

Do not take part in horseplay around herbicides.

When contacted by anyone regarding herbicides or their uses, refer these individuals to your supervisor, unless you are absolutely certain you can accurately answer their questions. Report any such contacts and what was said to your supervisor as soon as possible.



When setting up herbicide crew vehicles be sure to:

- Separate drinking water from herbicide mixing, washing, or rinse water so contamination cannot occur.
- Carry herbicides separate from the passenger compartment.
- Have available soap, wash water, towels, and eyewash.
- Have a plastic bag for storage and later disposal of contaminated materials.
- Take along absorbent materials such as kitty litter.
- Have a shovel for cleanup and disposal in your vehicle.

Your district pesticide coordinator has additional and updated information on pesticides. Ask your coordinator for additional reading material.

Answers and Discussion

Self-Test No. 1—Toxicity

1. c. Toxicity is the natural capacity of a substance to produce injury.

2. b. If a poisonous substance is continually taken into the body and is not passed with waste materials, it could build up to a lethal level.

3. b. In 1900, the average lifespan in the United States was about 47 years; today it is over 70 years.

4. a. Dermal toxicity refers to the ability of a chemical to produce injury if passed through the skin.

5. c. One part in a million is equal to about 1 tablespoon in 3,906 gallons.

6. a. True.

7. b. As the mg/kg decrease the toxicity increases; therefore, a chemical with an LD50 of 2 mg/kg chemical is more toxic than one with LD50 of 200 mg/kg.

8. a. As the amount of water added to a pesticide increases, the toxicity of the mixture decreases.

9. a. The oral LD50 of table salt is about 9 ounces, and that of Velpar L in the container is about 20 ounces for a 175-pound person. Therefore table salt is about twice as toxic as Velpar L.

10. a. True. You can project that if a 175-pound person drank about 18 ounces (about 1 pint) of Tordon 101R from the container, it would have a 50-percent chance of killing that person—if the victim did not vomit up the chemical or receive medical treatment.

11. d. There are three common ways in which pesticides enter the human body: through the skin, including the eyes; the mouth; and the lungs.

12. b. Roundup is considered to be slightly toxic in the container. When Roundup is mixed with water, the toxicity of the mixture is decreased even more.

Self-Test No. 2—Pesticide Labeling and Registration

1. c. Environmental Protection Agency (EPA) is correct.

2. a. It is not unusual for a company to spend over $10 million in research and development for a pesticide registration.

3. a. True.

4. b. False. A pesticide label is a legal document that must be followed by anyone using a pesticide.

5. c. "DANGER-POISON" and the skull and crossbones are required on the labels of all highly toxic substances, CATEGORY I.

6. a. True. All users should read and be familiar with the product label before using the pesticide, so as to apply the chemical in a correct manner and protect themselves and the environment.

7. a. It is Forest Service policy that only registered pesticides are used on National Forest System lands, and that they are used according to requirements and instructions.

8. b. The chronic (long-term) effects of pesticides are tested on animals before the pesticides are registered for public use.

Self-Test No. 3—Mixing and Applying Herbicides Safely

1. b. Herbicides are substances that kill or control plants. Insecticides kill insects. Rodenticides kill rodents.

2. c. The largest use of herbicides is in agriculture and industry; use in forestry is rather small.

3. b. The Forest Service uses herbicides that have a low order of toxicity.

4. c. Selective herbicides kill or affect only certain trees or grasses while having little or no effect on other plants.

5. b. False. Most of the herbicides we use can move a short distance through most soil and can be picked up by the roots of plants, even though the herbicide is not labeled as a soil-active chemical herbicide.

6. a. True. They pass through the body and are passed from the body with waste products.

7. c. A label should always be read and the instructions followed.

8. d. If the water is taken from private streams, ponds, wells, or springs we can be accused of contamination even though it is not true that we have not contaminated the water.

9. b. If you have cuts and skin abrasions, check with your supervisor before applying herbicides.

10. a. The amount of herbicides used in forest management represents only a small percentage of the pesticide used in the United States.

11. b. Herbicides splashed into the eyes should always be immediately washed out, usually for 10 to 15 minutes.

12. a. The mixture contains about 20 times more water than herbicide, so its toxicity is reduced by about 20 times.

13. b. Only a small part of the total National Forest System lands is treated each year with herbicides (one-tenth of 1 percent).

Self-Test No. 4—Transporting Herbicides

1. b. False. Only 1 day's supply of herbicides should be transported to the work site, and any left over at the end of the day returned to the storage building.

2. b. Transport herbicides in truck beds or trailers separated from the driver and any passenger.

3. b. False. Herbicides are expensive, so someone may take them for their own use or to sell. Children may take them out of curiosity.

4. b. False. Never travel across private lands when transporting herbicides, unless absolutely necessary. Then get permission.

5. a. True. Always be cautious when opening a herbicide container in hot weather, especially if the container appears to be expanded (swollen). Never point the opening toward your face.

6. c. The eyes should always be flushed with clean water at least 15 minutes using an eyewash container. Check the label for specific instructions.

7. a. True. This is a minimum list of emergency items in case of an accidental spill.

Self-Test No. 5—Storage and Spills

1. b. The pesticide storage building should remain locked when not in use.

2. b. False. Only pesticides and their application equipment should be stored in the building.

3. b. False. Some herbicides are flammable.

4. a. If the sump inside the storage building contains any amount of liquid, report this to your supervisor immediately.

5. c. Spills should be cleaned up immediately.

6. b. Cleanup materials must be placed in watertight containers and your supervisor notified to provide for proper disposal. Any herbicide spill should be cleaned up. Always report spills to your supervisor.

7. a. True. An inventory of the pesticides in the storage building should be posted on the building and near a phone at the work center.

Self-Test No. 6—Disposal of Containers

1. c. All empty herbicide containers shall be rinsed three times with water.

2. b. False. Herbicide containers must not be reused for anything.

3. a. True.

4. b. False. Herbicide containers that have been rinsed three times and destroyed may be buried on application sites.

Examination No. 2

Check with the District Coordinator for an examination.

The examination is a pass or not-pass test. A score of 70 percent is passing. If you do not pass, then study the areas again, and when you feel you know the materials, request another examination.

Checklist for Review

The following are suggested items to be covered by the employee's supervisor within 2 weeks after the initial training.

- Discussion of the labels and safety data sheets for the herbicides the employee will be using.

- Setup for field herbicide vehicle—
  Drinking water.
  Wash water, soap, towels.
  Change of clothing or coveralls.
  Eyewash container and how to use it.
  Safety glasses.
  Other safety items as appropriate.

- Appropriate dress for application.

- Herbicide application equipment—its safe use, calibration, cleaning, storage.

- Loading, securing, and transporting the herbicides.

- The uses for the pesticide storage building.

- Emergency telephone numbers.

- Other items or areas covered.

  _____

  _____

  _____

Do you consider the employee's understanding in these areas to be satisfactory? ____yes ____no

If no, state what training is planned to bring the employee's knowledge to a safisfactory level _____

_____

After the above additional training, do you consider the employee's knowledge to be satisfactory? ____yes ____no

_____ _____

Supervisor's Signature Date

_____ _____

Employee's Signature Date

☆ U. S. GOVERNMENT PRINTING OFFICE : 1986 482-808/42345